Apoptosis Glossary (Version 1.3)

Apoptosis: Greek word meaning the dropping of leaves from a tree. Describes the common morphological changes that characterize the process of cellular self-destruction.

Glossary

4-1BB	Also known as CD137. 4-1BB is a member of the TNF receptor family and induces apoptosis in T cells (Proc Natl Acad Sci USA 1989, 86:1963-1967; J Immunol 1998, 160:2488).
A	
A1	A Bcl-2 family member that is also known as BFL-1 protein. A1 is expressed in hemopoietic tissues, prolongs cell survival, and permits myeloid differentiation (J Immunol 1993, 151:1979-1988; Blood 1996, 87:983-992).
A20	A20 is a cytokine-induced primary response gene that encodes a protein that inhibits apoptosis (J Biol Chem 1990, 265:14705-14708; J Immunol 1995, 154:1699-1706).
AIF	Apoptosis inducing factor (FEBS Lett 1998, 427:198-202).
AIP1	A protein associated with the apoptosis-linked gene ALG2 (J Biol Chem 1999, 274:1533-1540).
Akt	Also known as protein kinase B or PKB. Akt is a serine/threonine kinase, that prevents apoptosis of neurons (Science 1997, 275:628- 630).
ALG-2	Apoptosis-linked gene-2. A pro-apoptosis gene that codes for a Ca++ binding protein required for T cell receptor and Fas induced cell death. ALG-2 is also involved in neuronal survival (Science 1996, 271:521-525).
ALG-3	Apoptosis-linked gene-3. An Alzheimer's Disease gene that protects PC12 cells from glutamate induced apoptosis (J Biol Chem 1996, 271:31025-31028).
Annexin-V	A phosphatidylserine binding protein that may be used for detecting apoptotic cells.
Apaf-1	Apoptosis protease activating factor-1. A human protein homologous to C. elegans CED-4 that participates with Caspase-9 (Apaf-3) in the cytochrome c-dependent activation of Caspase-3, leading to apoptosis (Cell 1997, 90:405-413).
Apaf-2	Apoptosis protease activating factor-2 (Also known as Cytochrome c).
Apaf-3	Apoptosis protease activating factor-3 (Also known as Caspase-9) (J Biol Chem 1996, 271:16720-16724).
APO-1	Also known as Fas and CD95, a member of the TNF receptor family. Cross-linking APO-1 induces apoptosis (J Biol Chem 1992, 267:10709-10715).
APO-1L	APO-1 ligand, also known as fas ligand. A member of the TNF family that induces apoptosis (Cell 1993, 75:1169-1178).
APO-2	Receptor for TRAIL/APO-2L. A member of the TNF receptor family (Curr Biol 1998, 8:113-116).
APO-2L	APO-2 ligand that is also known as TRAIL. APO-2L is a member of the TNF family that induces apoptosis (J Biol Chem 1996, 271:12687-12690).
APO-3	A death domain containing receptor. Also known as DR3, WSL-1, TRAMP or LARD (Curr Biol 1996, 6:1669-1676).
APO-3L	The ligand for the death-domain-containing receptor Apo-3. The Apo-3 ligand is a 249 amino-acid, type II transmembrane protein that induces apoptosis and NF-κB activation (Curr Biol 1998 8:525-528).
Apopain	Another name for Caspase-3. (Nat Struct Biol 1996, 3171:619-625).
Apoptosis	Greek word meaning the dropping of leaves from a tree. Describes the common morphological changes that characterize the process of cellular self-destruction (Br J Cancer, 1972, 26:239-245).
Apoptosome	The complex whose assembly is central to the activation of apoptosis and that comprises the vertebrate homologue of the nematode. Ced-4 protein, Apaf-1, holo-cytochrome c (released from mitochondria), deoxy-adenosinetriphosphate, and pro-Caspase-9 (Science 1998, 281:1317-1322).
ARC	Apoptosis repressor with caspase recruitment domain. ARC is expressed primarily in skeletal muscle and cardiac tissue and inhibits apoptosis (Proc Natl Acad Sci USA 1998, 95:5156-5160).

ASK1	Apoptosis signal-regulating kinase-1, also known as MEKK5 or MAPKKK5, induces apoptosis (Biochem Biophys Res Commun. 1997, 239:905-910).
B	
Bad	Bcl-xL/Bcl-2 associated death promoter. Bad is a heterodimeric partner for Bcl-xL and Bcl-2 that displaces Bax and promotes cell death (Cell 1995, 80:285-291).
Bag	Bcl-2 associated athanogene-1. Bag is a Bcl-2-binding protein which provides protection from apoptotic cell death (Cell 1995, 80:279-284).
Bak	Bcl-2 antagonist/killer. Bak is pro-apoptosis (Genomics 1997, 44:195-200).
Bax	Bcl-2 associated x protein. Bax is a member of the Bcl-2 family and is pro-apoptosis (Cell 1993, 74:609-619).
Bax alpha	One of the Bax isoforms that promotes apoptosis. The protein is 21 kDa.
Bax beta	One of the Bax isoforms that promotes apoptosis. The protein is 24 kDa.
Bax gamma	One of the Bax isoforms.
Bax omega	A splice variant of Bax (J Biol Chem 1998, 273:11930-11936).
Bcl-2	B-cell lymphoma 2. Belongs to the Bcl-2 family of proteins and is known to inhibit apoptosis.
Bcl-10	A CARD-containing protein with homology to herpesvirus-2 protein E10, identified in MALT B cell lymphomas. It is also known as mE10, c-E10, CARMEN, CLAP and CIPER. It activates NF-kB and is pro-apoptotic (Cell 1999, 96:35-45 and Nat Genet 1999, 22: 63-68).
Bcl-w	A member of the Bcl-2 family that promotes cell survival (Oncogene 1996, 13:665-675).
Bcl-x	A Bcl-x isoform that inhibits apoptosis (Biochem Biophys Res Commun 1998, 248:147-152).
Bcl-xL	Long form of Bcl-x. A Bcl-2-related gene that functions as a dominant regulator of apoptotic cell death. Bcl-xL inhibits cell death (Cell 1993, 74:597-608).
Bcl-xS	Short form of Bcl-x (BH1 and BH2 are spliced out). Bcl-xS is pro-apoptosis.
Beclin	A Bcl-2-interacting protein (J Virol 1998, 72:8586-96).
Bfl-1	A Bcl-2 homolog that has been isolated from a human fetal liver. Bfl-1, also known as A1, is anti-apoptosis (Oncogene 1995, 11:1693- 1698).
BH1	Bcl-2 homolog domain-1 (Adv Exp Med Biol 1996, 406:99-112).
BH2	Bcl-2 homolog domain-2 (Adv Exp Med Biol 1996, 406:99-112).
BH3	Bcl-2 homolog domain-3 (Adv Exp Med Biol 1996, 406:99-112).
BH4	Bcl-2 homolog domain-4 (Adv Exp Med Biol 1996, 406:99-112).
BI-1	Bax inhibitor-1 that suppresses apoptosis induced by Bax (Mol Cell 1998, 1:337-346).
Bid	BH-3 Interacting Domain Death agonist that induces ICE-like proteases and apoptosis (Genes Dev 1996, 10:2859-2869).
Bik	Bcl-2 interacting killer. Bik is a BH-3 domain containing protein that is also known as BP4, Bip1 and NBK. Bik is pro-apoptosis (Oncogene 1995, 11:1921-1928).
Bim	A member of the Bcl-2 family that promotes apoptosis (EMBO J 1998, 17:384-395).
Bip-1	Another name for Bik.
BIR Motif	A baculovirus IAP repeat motif that is involved in inhibiting apoptosis.
Blk	Bik-like killer protein. Blk is a BH3-containing mouse protein that interacts with Bcl-2 and Bcl-XL. Blk is a potent death agonist (J Biol Chem 1998, 273:7783-7786).
BOD	Bcl-2-related ovarian death gene, an ovarian BH3 domain-containing pro-apoptotic Bcl-2 protein. (Mol Endocrinol 1998,12:1432-40).
Bok	Bcl-2 related ovarian killer. Bok is a pro-apoptotic Bcl-2 protein with restricted expression in reproductive tissues that heterodimerizes with selective anti-apoptotic Bcl-2 family members (Proc Natl Acad Sci USA 1997, 94:12401-12406).
Boo	Inhibits apoptosis (EMBO J 1999, 18:167-178).
BP4	Another name for Bik.
Btf	Bcl-2-associated transcription factor. It interacts with Bcl-2 and Bcl-xL and plays a role in pro-apoptosis. (Mol Cell Biol 1999, 19:4390-4404).
C	

cIAP1	Cellular inhibitor of apoptosis protein 1. One of the molecules that is recruited to the cytosolic domain of TNF-RII via its association with TRAF1 and TRAF2 (Proc Natl Acad Sci USA 1996, 93:13973-13978).
cIAP2	Cellular inhibitor of apoptosis protein 2. One of the molecules that is recruited to the cytosolic domain of TNF-RII via its association with TRAF1 and TRAF2 (Proc Natl Acad Sci USA 1996, 93:13973-13978).
CAD	A caspase-activated DNase in mouse. CAD is homologous to human CPAN or DFF40 (Nature 1998, 391:43-50).
Calpain	A non-ICE cysteine proteinase, associated with apoptosis (J Cell Physiol 1994, 159:229-237).
CAML	Calcium-modulator and cyclophilin ligand. CAML is a co-inducer of NF-AT activation and binds to TACI, a member of TNF receptor superfamily (Nature 1994, 371:355-358; Science 1997, 278:138-141).
CAP-1	CD40-associated protein-1. CAP-1 specifically binds to the cytosolic domain of CD40 and contains a C-terminal domain that shares strong amino acid sequence homology to TRAF1 and TRAF2 (FEBS Lett 1995, 358:113-118).
CARD	Caspase activation and recruitment domain.
CARD4	A CED4/Apaf-1-like molecule that can regulate both apoptosis and NF-kB activation pathways. (J Biol Chem 1999, 274:12955-12958).
CARDIAK	CARD-containing ICE associated kinase, also known as RICK and RIP2, involved in NFk B/JNK signaling and in the generation of the proinflammatory cytokine IL-1 beta through activation of Caspase-1 (Curr Biol 1998, 8:885-888).
CARMEN	CARD containing molecule enhancing NF-κB, also known as Bcl-10, c-E10, CIPER, CLAP and mE10. It activates NF-kB and is pro-apoptotic. (J Biol Chem 1999, 274:9962-9968)
CART1	Cysteine rich domain associated to ring and traf protein. CART1 is also known as TRAF4 and is a novel member of the tumor necrosis factor receptor-associated protein family (J Biol Chem 1995, 270:25715-25721).
CAS	Cellular apoptosis susceptibility protein. Plays a role in toxin or TNF-α induced apoptosis (Proc Natl Acad Sci USA 1995, 92:10427-10431).
Caspase	Cysteinyl aspartic acid-protease (Human ICE/CED3 nomenclature (Cell 1996, 87:171).
Caspase-1	Cysteinyl aspartic acid-protease-1. Caspase-1 is also known as ICE and is a CED-3 homologue (Nature 1992, 356:768-774).
Caspase-2	Cysteinyl aspartic acid-protease-2. Caspase-2 is also known as Ich-1 and Nedd2 (Cell 1994, 78:739-750).
Caspase-3	Cysteinyl aspartic acid-protease-3. Caspase-3 is also known as CPP32, Yama, Apopain, SCA-1, and LICE (J Biol Chem 1994, 269:30761-30764).
Caspase-4	Cysteinyl aspartic acid-protease-4. Caspase-4 is also known as ICErel-II, TX and ICH-2 (EMBO J 1995, 14:1914-1922).
Caspase-5	Cysteinyl aspartic acid-protease-5. Caspase-5 is also known as ICErel-III and TY (J Biol Chem 1995, 270:15870-15876).
Caspase-6	Cysteinyl aspartic acid-protease-6. Caspase-6 is also known as Mch-2 (Cancer Res 1995, 55:2737-2742).
Caspase-7	Cysteinyl aspartic acid-protease-7. Caspase-7 is also known as Mch-3, ICE-LAP-3 and CMH-1 (Cancer Res 1995, 55:6045-6052).
Caspase-8	Cysteinyl aspartic acid-protease-8. Caspase-8 is also known as FLICE, Mach-1 and Mch5 (Cell 1996, 85:817-827).
Caspase-9	Cysteinyl aspartic acid-protease-9. Caspase-9 is also known as ICE-LAP6, Mch6 and Apaf-3 (J Biol Chem 1996, 271:16720-16724).
Caspase-10	Cysteinyl aspartic acid-protease-10. Caspase-10 is also known as FLICE-2 and Mch4 (J Biol Chem 1997, 272:6578-6583).
Caspase-11	Cysteinyl aspartic acid-protease-11 (FEBS Lett 1997, 403:61-69).
Caspase-12	Cysteinyl aspartic acid-protease-12 (FEBS Lett 1997, 403:61-69).
Caspase-13	Cysteinyl aspartic acid-protease-13. Caspase-13 is a FLICE activatable caspase, and is also known as ERICE (J Biol Chem 1998, 273:15702-15707).
Caspase-14	Cysteinyl aspartic acid-protease-14, also know as MICE. Overexpression of MICE induces apoptosis (J Biol Chem 1998, 273:29648-29653 and Cancer Res 1998, 58:5201-5205).
Casper	A FADD- and caspase-related inducer of apoptosis known as FLIP (Immunity 1997,

	6:751-763).
CD40	A member of the tumor necrosis factor receptor superfamily that regulates B-lymphocyte proliferation, immunoglobulin class-switching, and apoptosis (FEBS Lett 1995, 352:113-118).
CD40L	CD40 ligand. CD40L is also known as CD154 and TRAP (Eur J Immunol 1992, 22:3191-3194).
c-E10	A CARD-containing protein with homology to herpesvirus-2 protein E10, also known as Bcl-10, CARMEN, CIPER, c-E10 and mE10. It activates NF-κB and is pro-apoptotic (J Biol Chem 1999, 274:20127-20132).
CED-1	A cell death gene in the nematode C. elegans (Brain Pathol 1996, 6:411-425).
CED-3	A cell death gene in the nematode C. elegans. CED-3 promotes apoptosis and is a homologue to Apaf-3/Caspase-9 and Caspase-3 (J Biol Chem 1994, 269:30761-30764).
CED-4	A cell death gene in Caenorhabditis elegans. CED-4 is a cell death activator and a homologue to Apaf-1 (Cell 1997, 90:405-413).
CED-4L	The longer form of CED4 that inhibits apoptosis.
CED-4S	The short form of CED4 that induces apoptosis (Brain Pathol 1996, 6:411-425).
CED-9	A cell death gene in nematode C. elegans. CED-9 belongs to the Bcl-2 family and is also known as cell death protein 9 (Cell 1994, 76:665-676).
CIDE	A novel family of cell death activators with homology to the 45 kDa subunit of the DNA fragmentation factor (EMBO J 1998, 17:2526-2533).
CIPER	CED-3/ICH-1 prodomain homologous, E10-like regulator, also known as Bcl-10, c-E10, CARMEN, CLAP and mE10. It is a CARD-containing protein and pro-apoptotic (J Biol Chem 1999, 274:9955-9961).
CLAP	CARD-like apoptotic protein. Also know as Bcl-10, CARMEN, CIPER, c-E10 and mE10. (J Biol Chem 1999, 274:17946-54).
CLARP	A death effector domain-containing protein that interacts with Caspase-8 and regulates apoptosis. Also known as FLIP (Proc Natl Acad Sci USA 1997, 94:10717-10722).
CPAN	Caspase activated nuclease. CPAN is also known as DFF40, a subunit of DFF, that degrades DNA and induces DNA fragmentation. CPAN is homologous to mouse CAD (Curr Biol 1998, 8:537-540).
CPP32	Also known as Caspase-3 (J Biol Chem 1994, 269:30761-30764).
CRADD	Caspase and RIP adaptor with death domain. CRADD is involved in apoptosis signaling in response to TNF-RI stimulation (Cancer Res 1997, 57:615-619).
CrmA	Cytokine response modifier A is a viral product that inhibits apoptosis.
Cytochrome c	An electron carrier in the cell respiratory chain that plays a critical role in apoptosis (Cell 1996, 86:147-157).)
D	
D4-GDI	GDP-Dissociation Inhibitor for Ras-related Rho family GTPase. D4-GDI is a substrate for Caspase-3 (Eur J Immunol 1998, 28:296-304).
DAP kinase	Death associated protein kinase. DAP kinase is a mediator of apoptosis induced by IFN-g (Mol Cell Biol 1998, 8:1642-1651).
DAP-1	Death associated protein-1. DAP-1 is a 15 kDa protein and a mediator of gamma interferon-induced cell death (Genes Dev 1995, 9:15-30).
DAP-3	Death associated protein-3. DAP-3 is a mediator of gamma interferon induced cell death (J Biol Chem 1995, 270:27932-27936).
DAP-5	Death associated protein-5. DAP-5 is a mediator of gamma interferon induced cell death (Mol Cell Biol 1997, 17:1615-1625).
Daxx	Daxx is a Fas-binding protein. Over-expression of Daxx enhances Fas-mediated apoptosis (Cell 1997, 89:1067-1076).
DcR-1	Decoy receptor-1. DcR-1 is a receptor for TRAIL that inhibits TRAIL signaling. DcR-1 is also known as TRID, LIT and TRAIL-R3 (Science 1997, 277:815-818).
DcR-2	Decoy receptor 2. DcR-2 is the receptor for Trail that contains a truncated death domain and functions as an inhibitory Trail receptor. DcR-2 is also known as TRAIL-R4 (Curr Biol 1997, 7:1003-1006).
DcR-3	Decoy receptor 3. It binds to FasL and inhibits FasL-induced apoptosis, (Nature 396:699-703.)

DD	Death domain.
Death Effector Filaments	Cytoplasmic structures that recruit caspases and trigger apoptosis (J Cell Biol 1998, 141:1243-1253).
DED	Death Effector Domain.
DEDD	A death effector domain-containing protein, induces apoptosis (EMBO 1998, 17:5974-86).
DEFT	Death Effector domain-containing Testicular molecule, highly expressed in testis germ cells (Endocrinology 1998, 139:4839-4848).
DEHD-AMC	A synthetic tetrapeptide DEHD (Asp-Glu-His-Asp) conjugated to 7-amino-4-methyl coumarin, DEHD-AMC is a fluorogenic substrate for Caspase-2.
DEVD	Amino acid residues (Asp-Glu-Val-Asp) of Caspase-3 cleavage site within PARP.
DEVD-AFC	A tetrapeptide Asp-Glu-Val-Asp conjugated to 7-amino-4- trifluoromethyl coumarin, a fluorometric substrate for caspase enzyme activity assay.
DEVD-CHO	Asp-Glu-Val-Asp-aldehyde. DEVD-CHO is a synthetic Caspase-3 inhibitor.
DEVD-FMK	Asp-Glu-Val-Asp-O-methyl-fluoromethylketone. DEVD-FMK is a synthetic Caspase-3 inhibitor.
DEVD-pNA	A synthetic tetrapeptide DEVD (Asp-Glu-Val-Asp) conjugated to p-nitroanilide (pNA), a colorimetric substrate for caspase enzyme activity assay.
DEVD-AMC	Asp-Glu-Val-Asp-7-Amino-4-methyl coumarin. DEVD-AMC is a fluorogenic substrate for Caspase-3.
DFF	DNA Fragmentation Factor. DFF is a heterodimer of a 45 kDa (DFF45) and 40 KDa (DFF40) protein.
DFF40	A 40 kDa subunit of DFF. DFF40 is the active component of DFF and triggers DNA fragmentation during apoptosis (Proc Natl Acad Sci USA 1998, 95:8461-8466).
DFF45	A 45 kDa subunit of DFF. DFF45 is also know as ICAD. During apoptosis, Caspase-3 cleaves DFF45 which then dissociates from DFF40 (Cell 1997, 89:175-184).
DISC	Death inducing signaling complex.
Diva	A Bcl-2 homologue, binds to apaf-1 and induces BH3-independent cell death (J Biol Chem. 1998, 273:32479-86).
DNA-PK	DNA-dependent protein kinase. DNA-PK is involved in DNA double-strand-break repair.
DNA-PKcs	DNA-dependent protein kinase catalytic site. DNA-PKcs is a catalytic domain of DNA-PK.
DP5	Neuronal death protein. DP5 is a death promoting gene (J Biol Chem 1997, 272:18842-18848; Brain Res Mol Brain Res 1998, 54:316-320).
DR-3	Death receptor-3. DR-3 is a member of the TNF receptor family that is also known as Apo-3, WSL-1, TRAMP or LARD (Science 1996, 274:990- 992).
DR-4	Death receptor-4. One of the receptors for TRAIL that is also known as TRAIL-R1 (Science 1997, 276:111-113).
DR-5	Death receptor-5. One of receptors for TRAIL that is also known as TRAIL-R2 (Immunity 1997, 7:821-830).
DR-6	Death receptor-6, DR6 interacts with TRADD, which has previously been shown to associate with TNFR1. It induces apoptosis and activation of both NF-kB and JNK (FEBS Lett 1998, 431:351-356).
DRAK1	DAP kinase-related apoptosis-inducing protein kinase 1, a serine/threonine kinase related to death-associated protein kinase (J Biol Chem 1998, 273:29066-29071).
DRAK2	DAP kinase-related apoptosis-inducing protein kinase 2, a serine/threonine kinase related to death-associated protein kinase (J Biol Chem 1998, 273:29066-29071).

E

ERICE	A FLICE-activatable caspase. Also known as caspase-13 (J Biol Chem 1998, 273:15702-15707).
Endothelial IL-8	Interleukin-8. IL-8, a neutrophil chemoattractant, can also induce apoptosis (Biochem Biophys Res Comm 1998, 243:407-411).

F

FADD	Fas associated death domain. FADD is also known as MORT-1, an apoptotic adaptor molecule that recruits Caspase-8 or Caspase-10 to the activated Fas or TNF-RI

receptors (Cell 1995, 81:505-512).

FAF-1	Fas associated factor-1. FAF-1 potentiates apoptosis.
FAP-1	Fas associated phosphatase-1. FAP-1 is a protein tyrosine phosphatase that associates with Fas (Science 1995, 268:411-415).
Fas	Known as CD95 and APO-1. Fas is a member of the TNF receptor family and promotes apoptosis (Cell 1991, 66:233-243).
Fas L	Fas ligand. FasL is also known as APO-1 ligand (Cell 1993, 75:1169-1178).
FLAME-1	FADD-like anti-apoptotic molecule, inhibitor of Fas/TNF-RI induced apoptosis, also known as FLIP (J Biol Chem 1997, 272:18542-18545)
FLICE	Fadd-like ICE. FLICE is also known as Caspase-8 (Cell 1996, 85:817-827).
FLICE-2	Fadd-like ICE-2. FLICE-2 is also known as Caspase-10 (J Biol Chem 1997, 272:6578-6583).
FLIP	FLICE inhibitory protein. FLIP regulates apoptosis and is also known as I-FLICE, CASH, CLARP, FLAME-1, Casper, and MRIT (Nature 1997, 388:190-195).

G

GITR	Glucocorticoid-induced TNF receptor family related gene. GITR is a member of the tumor necrosis factor/nerve growth factor receptor family that inhibits T cell receptor-induced apoptosis (Proc Natl Acad Sci USA 1997, 94:6216-6221).
Granzyme A	A serine protease located in the granules of cytotoxic T cells and NK cells that is involved in the induction of target cell apoptosis (J Immunol 1988, 141:3471-3477).
Granzyme B	A serine protease located in the granules of cytotoxic T cells and NK cells that is involved in the induction of target cell apoptosis (J Immunol 1988, 141:3471-3477).

H

Hdaxx	Human homologue to murine Daxx. Hdaxx binds to the death domain of Fas (CD95) (J Cell Sci 1998, 111:2029-2041).
HIAP1	Human inhibitor of apoptosis protein 1. HIAP1, also known as c-IAP2, is a member of the IAP family and is an apoptotic suppressor (Cell 1995, 83:1243-1252).
HIAP2	Human inhibitor of apoptosis protein 2. HIAP2, also known as c-IAP1, is a member of IAP family and an apoptotic suppressor (Proc Natl Acad Sci USA 1996, 93:13973-13978).
HILP	Human IAP-like protein, regulates programmed cell death downstream of Bcl-xL and cytochrome c. Also known as XIAP (Mol Cell Biol 1998, 18:608-615).
HrK	A product of harakiri. Hrk is a member of Bcl-2 family and activates apoptosis (EMBO J 1997, 16:1686-1694).
HVEM	Herpesvirus entry mediator, a member of TNF receptor superfamily, mediates herpesvirus entry into cells during infection (Cell 1996, 87:427-436).
HVEM-L	Herpesvirus entry mediator ligand, a ligand for HVEM/TR2, stimulates proliferation of T cells and inhibits HT29 cell growth (J Biol Chem 1998, 273:27548-56).

I

IAPs	Inhibitor of apoptosis proteins. The proteins include NAIP, c-IAP1, c-IAP-2, X-IAP and survivin (J Virol 1993, 67:2168-2174).
IB	Inhibitor of NF-κB.
ICAD	Inhibitor of caspase-activated DNAse. ICAD is the mouse homologue to human DFF45 (Nature 1998, 391:43-50).
ICE	Interleukin-1b converting enzyme. ICE is also known as Caspase-1 (Science 1992, 256:97-100).
ICE-LAP3	ICE-like apoptotic protease 3. ICE-LAP3 is also known as Caspase-7 (J Biol Chem 1996, 271:1621-1625).
ICE-LAP6	ICE-like apoptotic protease 6. ICE-LAP6 is also known as Caspase-9 (J Biol Chem 1996, 271:16720-16724).
ICErel II	ICE/CED-3-related protease. ICErel II is also known as Caspase-4 (J Biol Chem 1995, 270:15870-15876).
ICErel III	ICE/CED-3 related protease. ICErel III is also known as Caspase-5 (J Biol Chem 1995, 270:15870-15876).

Ich-1	ICE and ced-3 homologue-1. Ich-1 is another name for Caspase-2 (Cell 1994, 78:739-750).
Ich-1L	Alternatively spliced Ich-1. Ich-1L codes for 435 amino acids and promotes apoptosis.
Ich-1s	Alternatively spliced Ich-1. Ich-1s codes for 312 amino acids and suppresses apoptosis.
Ich-2	Ice and ced-3 homologue-2. Ich-2 is also known as Caspase-4 (J Biol Chem 1995, 270:15250-15256).
IETD	Ile-Glu-Thr-Asp. The amino acid sequence corresponds to one of the Caspase-8 cleavage sites (amino acids 172-175) of the inactive caspase-3 precursor.
IETD-AFC	A tetrapeptide, Ile-Glu-Thr-Asp, conjugated to 7-amino-4- trifluoromethyl coumarin, a fluorometric substrate for Caspase-8-like enzyme activity assay.
IETD-AMC	Ile-Glu-Thr-Asp-7-Amino-4-methyl coumarin. IETD-AMC is a fluorogenic substrate for Caspase-8.
IETD-CHO	Ile-Glu-Thr-Asp-aldehyde. IETD-CHO is a synthetic caspase-8 inhibitor.
IETD-FMK	Ile-Glu-Thr-Asp-O-methyl-fluoromethyketone. IETD-FMK is a synthetic Caspase-8- like inhibitor.
IETD-pNA	A synthetic tetrapeptide DEVD, Ile-Glu-Thr-Asp, conjugated to p-nitroanilide (pNA), a colorimetric substrate for Caspase-8-like enzyme activity assay.
IEX-1L	An apoptosis inhibitor involved in NF-κB mediated cell survival (Science 1998, 281:998-1001).
I-FLICE	Inhibitor of FLICE. I-FLICE is also known as CASH, CLARP, FLIP and FLAME-1 (J Biol Chem 1997, 272:17255-17257).
IGIF	Interferon-gamma-inducing factor, also known as IL-18, enhances FasL mediated cytotoxicity (Nature 1995, 378:88-91).
IkB	Inhibitor of NF-κB.
IKKs	IkB kinases, including IKKα (IKK1), IKKβ (IKK2), IKKγ (IKK3/IKKAP1/NEMO) (Cell 1997, 91:243-252 and J Exp Med 1999, 189:1839-1845).
ITA	Inhibitor of T-cell apoptosis. ITA is a member of IAP family (DNA Cell Biol 1996,15:981-988).
I-TRAF	A TRAF-interacting protein. I-TRAF is also known as TANK (Proc Natl Acad Sci USA 1996, 93:8241-6).

K

Ku p70	A 70 KDa subunit of Ku autoantigen. Ku p70 is a component of activated DNA-PK.
Ku p80	A 80 KDa subunit of Ku autoantigen. Ku p80 is a component of activated DNA-PK.

L

Lamin A	A structural protein of the nuclear envelope that assists in maintaining the nuclear shape (Proc Natl Acad Sci USA 1986, 83:6450-6454).
Lamin B	A structural protein of the nuclear envelope that assists in maintaining the nuclear shape.
LARD	Lymphocyte-associated receptor of death. LARD is a receptor for Apo-3L and is also known as DR3, WSL-1, TRAMP and APO-3 (Proc Natl Acad Sci USA 1997, 94:4615-4619).
LBR	A chromatin and lamin binding protein from the inner nuclear membrane. LBR is proteolyzed during the late stages of apoptosis (J Cell Sci 1998, 111:1441-1451).
LEHD-AFC	A synthetic tetrapeptide LEHD (Leu-Glu-His-Asp) conjugated to 7-amino-4-trifluoromethyl coumarin, LEHD-AFC is a fluorogenic substrate for Caspase-1.
LEHD-AMC	A synthetic tetrapeptide LEHD (Leu-Glu-His-Asp) conjugated to 7-amino-4-methyl coumarin, LEHD-AMC is a fluorogenic substrate for Caspase-9.
LEHD-CHO	Leu-Glu-His-Asp-aldehyde. LEHD-CHO is a synthetic Caspase-9 inhibitor.
LEHD-pNA	A synthetic tetrapeptide LEHD (Leu-Glu-His-Asp) conjugated to p-nitroanilide (pNA), a colorimetric substrate for Caspase-9 enzyme activity.
LEVD-AFC	A synthetic tetrapeptide LEVD (Leu-Glu-Val-Asp) conjugated to 7-amino-4-trifluoromethyl coumarin, LEVD-AFC is a fluorogenic substrate for Caspase-4.
LEVD-CHO	Leu-Glu-Val-Asp-aldehyde. LEVD-CHO is a synthetic Caspase-4 inhibitor.
LIGHT	A ligand for lymphotoxin b receptor and TR2/HVEM, induces apoptosis (J Clin Invest 1998, 102:1142-51).

LIT	Lymphocyte inhibitor of TRAIL. LIT is also known as TRID, DcR-1 and TRAIL-R3 (J Immnuol 1998, 160:3-6).
LKLF	Lung Kruppel-like factor. LKLF is a transcriptional regulator of single-positive T cell quiescence and survival (Science 1997, 277:1986-1990).
Lymphotoxin	Also known as TNF-β (Cell 1993, 72:847-856).
M	
MACH	MORT-Associated CED-3 Homologue. MACH is another name for Caspase-8 (Cell 1996, 85:803-815).
MADD	Mitogen activated kinase activating death domain. MADD interacts with TNF-RI and activates MAP kinase activity (J Biol Chem 1997, 272:12069-12075).
MAPKKK5	Mitogen activated protein kinase kinase kinase 5, also known as ASK1, MEKK5, induces apoptosis (J Biol Chem 1996, 271:31607 and Science 1997, 275:90-94).
Mch2	Mammalian CED-3 homologue 2. Mch2 is another name for Caspase-6 (Cancer Res 1995, 55:2737-2742).
Mch3	Mammalian CED-3 homologue 3. Mch3 is another name for Caspase-7 (Cancer Res 1995, 55:6045-6052).
Mch4	Mammalian CED-3 homologue 4. Mch4 is another name for Caspase-10 (Proc Natl Acad Sci USA 1996, 93:7464-7469).
Mch5	Mammalian CED-3 homologue 5. Mch5 is another name for Caspase-8 (Proc Natl Acad Sci USA 1996, 93:14486-14491).
Mch6	Mammalian CED-3 homologue 6. Contains a CARD domain and is also known as Caspase-9 (J Biol Chem 1996, 271:16720-16724).
Mcl-1	Myeloid Cell Leukemia 1. A member of the Bcl-2 family, Mcl-1 is a mitochondrial protein that enhances cell viability under apoptotic conditions.
m-E10	A CARD-containing protein with homology to herpesvirus-2 protein E10, also known as Bcl-10, c-E10, CARMEN, CLAP and CIPER. (J Biol Chem 1999, 274:10287-10292).
MEKK5	Map/Erk kinase kinase 5, also known as ASK1, MAPKKK5, induces apoptosis (Science 1997, 275:90-94).
MIAP	Mouse inhibitor of apoptosis protein. MIAP is a homologue to human XIAP (Cell 1995, 83:1243-1252).
MICE	Mini-ICE, known as Caspase-14 (J Biol Chem 1998,273:29648-29653).
MORT1	A death domain containing adaptor that is another name for FADD (J Biol Chem 1995, 270:7795-7798).
MRIT	Mach-Related Inducer of Toxicity. MRIT interacts with Bcl-xL and FLICE and is also known as FLIP, CASH, FLAME-1, CLARP, Casper and I-FLICE (Proc Natl Acad Sci USA 1997, 94:11333-11338).
Mtd	A member of the Bcl-2 family that contains BH1, BH2, BH3 and BH4 domains and activates apoptosis in the absence of heterodimerization with Bcl-2 and Bcl-XL (J Biol Chem 1998, 273:8705-8710).
N	
NAIP	Neuronal apoptosis inhibitory protein. NAIP is a member of the IAP family and inhibits apoptosis (Cell 1995, 80:167-178).
NBK	Natural Born Killer. NBK induces apoptosis and is also known as Bik, BP4 and Bip1 (Mol Cell Biol 1996, 16:5857-5864).
NDF	Neu differentiation factor, also called neuregulin, induces apoptosis (J Exp. Med 1998, 188:1535-39).
Nedd2	Neural Precursor Cell Expressed, Developmentally Down-Regulated 2, mouse gene for Caspase-2.
NF-κB	Nuclear factor of immunoglobulin k locus in B cells. NF-κB activates transcription of genes in many tissues.
NGF	Nerve Growth Factor.
NGFR	Nerve Growth Factor Receptor (Cell 1986, 47:545-554).
NIK	NF-κB-inducing kinase. It is a serine/threoine kinase which activates IKKα (Proc Natl Acad Sci USA 1998, 95:3792-7).
NIP-3	Nineteen kD interacting protein-3, an E1B 19K and Bcl-2 binding protein which induces apoptosis (J Biol Chem 1999, 274:7-10).

NIPK	Neuronal cell death inducible putative kinase. Involved in programmed cell death via a pathway that is present in neurons but is absent in non-neurons (Biochem Biophys Res Commun 1999, 258:260-264).
NIX	A homolog of the E1B 19K/Bcl-2 binding and pro-apoptotic protein Nip3. Nix and Nip3 form a subfamily of pro-apoptotic mitochondrial proteins (J Biol Chem 1999, 274:7-10).
Nod1	A CED-4/Apaf-1-like molecule that can regulate both apoptosis and NF-κB activation pathways. Also known as CARD4 (J Biol Chem 1999, 274:14560-14567).
O	
OPG	Osteoprotegerin. OPG is a TRAIL receptor (J Biol Chem 1998, 273:14363-14367).
OX-40	A member of the nerve growth factor family that is expressed on activated lymphocytes. OX-40 is also know as CD134.
P	
p53	A tumor suppressor gene product that promotes apoptosis.
PARP	Poly (ADP ribose) polymerase. A DNA repair enzyme cleaved by caspases during apoptosis.
PCD	Programmed Cell Death.
Perforin	A protein secreted mainly by cytotoxic T cells or NK cells that punctures a pore on a cell membrane (J Immunol 1989, 143:4267-4274).
PFP	Pore-forming protein. PFP is also known as perforin (Immunogenetics 1989, 30:452-457).
PI	Propidium Iodide. A DNA dye for excluding dead cells. Combined with Annexin-V FITC, PI distinguishes early apoptotic cells from late apoptotic or necrotic cells.
PKR	Double-stranded (ds) RNA-dependent protein kinase. It is a key mediator of antiviral effects of interferon (IFN) and an active player in apoptosis induced by different stimuli. (Mol Cell Biol 1999, 19:4653-4663).
PS	Phosphatidylserine. PS is a lipid that translocates to the cell surface when cells go into apoptosis. PS may be detected by Annexin-V.
R	
RAIDD	RIP associated Ich-1/CED homologous protein with death domain. RAIDD is a death adaptor molecule (Nature 1997, 385:86-89).
RANK	Receptor activates NF-κB. RANK interacts with tumor necrosis factor receptor-associated factors, NF-κB and Jak (c-jun n-terminal kinase) (J Biol Chem 1998, 273:20551-20555).
RANKL	RANK ligand, also know as TRANCE or osteoprotegerin ligand. It is a member of TNF family (Nature 1997, 390:175-179).
RICK	A protein kinase containing a caspase recruitment domain, also known as RIP2 and CARDIAK. RICK interacts with CLARP and regulates CD95-mediated apoptosis (J Biol Chem 1998, 273:12296-12300).
RIP	Receptor interacting protein. A Fas-binding protein containing death domain that is crucial for TNF-RI mediated NF-kB activation (Cell 1995, 81:513-523).
RIP2	Receptor interacting protein-2, also known as RICK and CARDIAK. It is a NF-κB-activating and cell death-inducing kinase (J Bio Chem, 273:16968-16975).
RIP3	Receptor interacting protein-3. a RIP-like kinase that activates apoptosis and NF-κB. It is a potent inducer of apoptosis, capable of selectively binding to large prodomain initiator caspases. (Curr Biol 1999, 9:539-542 and J Biol Chem 1999, 274:16871-16875)
S	
SCA-1	SREBP cleavage activity 1. SCA-1 is another name for Caspase-3 (J Biol Chem 1995, 270:18044-18050).
SCA-2	SREBP cleavage activity 2. SCA-2 is another name for Caspase-7/Mch3 (Proc Natl Acad Sci USA 1996, 93:5437-5442).
SODD	Silencer of death domain. It acts as a silencer of TNF-RI signaling and prevents apoptosis (Science 1999, 283:543-546).

SREBP-1	Sterol regulatory element binding protein-1. A basic helix-loop-helix-leucine zipper protein that controls transcription of the low density lipoprotein receptor gene (Cell 1993, 75:187-197).
SREBP-2	Sterol regulatory element binding protein-2. A basic-helix-loop-helix-leucine zipper protein that stimulates transcription by binding to sterol regulatory element (Proc Natl Acad Sci USA 1993, 90:11603-11607).
Survivin	A member of the inhibitors of apoptosis protein family. Survivin is anti-apoptosis (Nature Med 1997, 3:917-921).
T	
TACI	Transmembrane activator and interacts with CAML.
TANK	TRAF family member-associated NF-κB activator. TANK is also known as I-TRAF (Proc Natl Acad Sci USA 1996, 93:11085-11090).
THANK	TNF homologue that activates apoptosis, and NF-κB, and JNK, a member of TNF family (J Biol Chem 274:15978-15981).
TIAR	RNA binding protein related to TIA-1. Both proteins are effectors of apoptotic cell death. During Fas-mediated apoptosis, TIAR exhibits rapid translocation from the nucleus to the cytoplasm.
TL1	A TNF-like cytokine, induces apoptosis in endothelial cells (J Biol Chem 1999, 274:1479-1486).
TL2	A TNF-like cytokine, also known as TRAIL (Gene 1997, 204:35-46).
TNF	Tumor necrosis factor.
TNF-RI	Tumor necrosis factor receptor I. A 55 kDa protein (p55) that is also known as CD120a.
TNF-RII	Tumor necrosis factor receptor II. A 75 kDa protein (p75) that is also known as CD120b.
Toso	A cell surface specific regulator of Fas-induced apoptosis in T cells (Immunity 1998: 8:461-471).
TR1	TNF receptor related 1, also known as osteoprotegrin (OPG) (Gene 1997,204:35-46).
TR2	TNF receptor related 2, also known as HVEM (J Immunol 1998, 161:1786-94).
TR2L	TR2L protein inhibited TNF cytotoxic response (Biochem Biophys Res Commun 1996, 227:266-272).
TR3	TNF receptor related 3, also known as DR3/WSL-1/Apo-3/TRAMP/LARD (Gene 1997, 204:35-46).
TRADD	TNF Receptor I associated death domain. Over-expression of TRADD leads to two major TNF-induced responses, apoptosis and activation of NF-κB (Cell 1995, 81:495-504).
Traf-1	TNF Receptor Associated factor-1. A signal transducer associated with the cytoplasmic domain of TNF receptor II (Cell 1994, 78:681-692).
Traf-2	TNF Receptor Associated factor-2. Mediates CD30-induced NF-kB activation (Proc Natl Acad Sci USA 1996, 93:14053-14058).
Traf-3	TNF Receptor Associated factor-3. Interacts with CD30 cytoplasmic domain (Proc Natl Acad Sci USA 1996, 93:14053-14058).
Traf-4	TNF Receptor Associated factor-4. Traf-4 interacts with the cytosolic domain of the lymphotoxin receptor (Am J Pathol 1998, 152:1549-1561).
Traf-5	TNF Receptor Associated factor-5. Traf-5 is a member of the TRAF family and mediates CD40 signaling (Proc Natl Acad Sci USA 1996, 93:9437-9442).
Traf-6	TNF Receptor Associated factor-6. Traf-6 mediates CD40 signaling (J Biol Chem 1996, 271:28745-28748).
TRAIL	Tumor necrosis factor (TNF)-related apoptosis-inducing ligand. TRAIL is also known as Apo-2L and is a member of the TNF family that induces apoptosis (Immunity 1995, 3:673-682).
TRAIL-R1	TRAIL-receptor 1. TRAIL-R1 is also known as DR4 and AOP-2 (Immunity 1997, 7:831-836).
TRAIL-R2	TRAIL-receptor 2. TRAIL-R2 is also known as DR-5 (Immunity 1997, 7:821-830).
TRAIL-R3	TRAIL-receptor 3. TRAIL-R3 is also known as DcR1, TRID and LIT (J Exp Med 1997, 186:1165-1170).
TRAIL-R4	TRAIL-receptor 4. TRAIL-R4 is also known as DcR2 (Curr Biol 1997, 7:1003-1006).
TRAMP	TNF receptor apoptosis-mediating protein. TRAMP is an apoptosis-mediating receptor with homology to TNF-RI and Fas. TRAMP is also known as DR3, APO-3, WSL, and LARD (Immunity 1997, 6:79-88).

TRANCE	TNF-related activation-induced cytokine. TRANCE is a member of the TNF family and expressed predominantly in T cells (J Biol Chem 1997, 272:25190-25194).
TRAP	Tumor necrosis factor-related activation protein. A member of the TNF superfamily that is also known as CD40 ligand and CD154 (Eur J Immunol 1992, 22:3191-3194).
TRICK2	Trail receptor inducer of cell killing 2. An alternatively spliced receptor that transduces the cytotoxic signal from TRAIL (Curr Biol 1997, 7:693-696).
TRID	TRAIL receptor without an intracellular domain. TRID is an antagonist decoy receptor and is also known as DcR1, TRAIL-R3 and LIT (Science 1997, 277:815-818).
TRIP	TRAF interacting protein. A component of TNFR- and CD30-TRAF signaling complexes that inhibits TRAF2-mediated NF-κB activation (J Exp Med 1997, 185:1275-1285).
TRUNDD	Trail receptor with a truncated death domain that plays an inhibitory role in apoptosis (FEBS Lett 1998, 424:41-45).
TUNEL	Terminal deoxynucleotidyl transferase-mediated dUTP nick-end-labeling. A method for detecting apoptotic cells based on the DNA fragmentation during apoptosis.
TWEAK	A secreted ligand in the TNF family that weakly induces apoptosis (J Biol Chem 1997, 272:32401-32410).
TX	TX protease. TX is another name for Caspase-4 (EMBO J 1995, 14:1914-1922).
TY	TY protease. TY is another name for Caspase-5 (J Biol Chem 1995, 270:15870-15876).

V

VDVAD-AFC	A synthetic peptide VDVAD(Val-Asp-Val-Ala-Asp) conjugated to 7-amino-4-trifluoromethyl coumarin, VDVAD-AFC is a fluorogenic substrate for Caspase-2.
VDVAD-pNA	A synthetic peptide VDVAD(Val-Asp-Val-Ala-Asp) to p-nitroanilide (pNA), a colorimetric substrate for Caspase-2 enzyme activity.
VEID	Val-Glu-Ile-Asp, amino acid residues which correspond to one of the Caspase-6 cleavage sites of lamin A.
VEID-AFC	A synthetic tetrapeptide, Val-Glu-Ile-Asp, conjugated to 7-amino-4- trifluoromethyl coumarin. VEID-AFC is a fluorometric substrate for Caspase-6 enzyme activity assay.
VEID-AMC	Val-Glu-Ile-Asp-7-amino-4-methyl coumarin. VEID-AMC is a fluorogenic substrate for Caspase-6.
VEID-CHO	Val-Glu-Ile-Asp-aldehyde. VEID-CHO is a synthetic Caspase-6 inhibitor.
VEID-FMK	Val-Glu-Ile-Asp-O-methyl-fluoromethylketone. VEID-FMK is a synthetic Caspase-6 inhibitor.
VEID-pNA	A synthetic tetrapeptide Val-Glu-Ile-Asp conjugated to p-nitroanilide (pNA). VEID-pNA is a colorimetric substrate for Caspase-6 like enzyme activity assay.

W

WSL-1	A death-domain-containing receptor that mediates apoptosis. WSL is also known as APO3, DR3, TRAMP and LARD (Nature 1996, 384:372-375).

X

XIAP	X-linked inhibitor of apoptosis protein. XIAP, also known as HILP, is a member of IAP family that inhibits apoptosis (EMBO 1998, 17:2215-2223).

Y

Yama	Another name for Caspase-3 (J Biol Chem 1994, 269:30761-30764).
YAVD-AFC	A synthetic tetrapeptide YVAD (Tyr-Val-Ala-Asp) conjugated to 7-amino-4-trifluoromethyl coumarin, YAVD-AFC is a fluorogenic substrate for Caspase-1.
YAVD-AMC	A synthetic tetrapeptide YVAD (Tyr-Val-Ala-Asp) conjugated to 7-amino-4-methyl coumarin, YAVD-AMC is a fluorogenic substrate for Caspase-1.
YAVD-CHO	Tyr-Val-Ala-Asp-aldehyde. YAVD-CHO is a synthetic Caspase-1 inhibitor.
YVAD	Amino acid residues (Tyr-Val-Ala-Asp) of Caspase-1 cleavage site within interleukin-1b.
YVAD-pNA	A synthetic tetrapeptide YVAD (Tyr-Val-Ala-Asp) conjugated to p-nitroanilide (pNA), a colorimetric substrate for Caspase-1 enzyme activity.

Z

ZIP kinase — Zipper-interacting protein kinase, a serine/threonine kinase that mediates apoptosis (Mol Cell Biol 1998, 18:1642-1651).

zVAD-FMK — Benzyloxy-valine-alanine-aspartate-O-methyl-fluoromethylketone. zVAD-FMK is a synthetic caspase inhibitor.

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